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ABSTRACT

This study investigated the way kindergarten classroom teachers delivered information to students to see if it affected the amount of information students could remember about the solar system. The study also examined whether this difference would be related to the degree of musical aptitude possessed by each student. The students were pretested on solar system facts; then the intervention began. The teacher in each of 16 kindergarten classrooms presented information in either a speaking voice, a speaking voice with repetition, a chanting voice, or a singing voice to four groups of students. After the 20-day intervention, students completed the knowledge test again. Students also completed the Primary Measures of Music Audition to determine their degree of musical aptitude. Data analysis indicated that the speaking with repetition group scored lower than the chanting and singing groups but significantly higher than the speaking alone group. The singing and chanting groups had similar scores. There was no correlation between students' musical aptitude and their gain score. (Contains 11 references.) (SM)

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An Analysis of Content Delivery Systems Using Speaking Voice, Speaking with Repetition Voice, Chanting Voice, and Singing Voice

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Abstract

Statement of the Problem:

What is the difference between kindergarten students who hear factual information about the solar system delivered in a teacher's speaking voice, a teacher's speaking voice with repetition, a teacher's chanting voice, or a teacher's singing voice on the criterion variable of solar system factual knowledge, and is this difference related to the degree of musical aptitude possessed by each student?

Summary:

A random sample of 360 kindergarten students participated in a study to determine if the way their classroom teacher delivered information to them affected the amount of factual information they were able to remember about the solar system on a researcher designed pre and post test. The musical aptitude of the subjects was tested using Gordon's Primary Measure of Music Audiation. The control group of children heard the factual information presented in the traditional method of listening to the teacher's normal speaking voice. A second group heard the same information presented by the teacher's normal speaking voice but with certain key phrases repeated for emphasis. A third group heard the information in a repeated, rhymed chanting voice. A fourth group had the information sung to them. Subjects were tested individually on all testing instruments.

Results:

A one way analysis of variance (ANOVA) performed on the gain scores on the Solar System Factual Knowledge Tests results of the four groups indicated that the speaking with repetition group scored lower than either chanting or singing, but significantly higher than speaking alone. Although the gain scores of the singing groups and the chanting groups were higher than either of the other two groups, they were not significantly different from each other (F=42.6; df=356; p=.000). The results of the Pearson correlation coefficient statistical procedure showed no correlation between students' musical aptitude and their gain score (correlation = 0.0547, p=0.301).

An Analysis of Content Delivery Systems Using Speaking Voice, Speaking with Repetition Voice, Chanting Voice, and Singing Voice

The field of curriculum design in early childhood education is currently experiencing pressure from proponents of two conflicting philosophies vying for precedence. One philosophy is academic in nature. Its proponents, such as E.D. Hirsch, Jr., Al Shanker, and James Stone, urge the teaching of more specific academic areas and the early development of literacy and numeracy skills along with a corresponding core curriculum necessary to function effectively in our culture. They encourage the young child's growing acquisition of factual knowledge and point to the increased self-esteem that knowledge generates in children. Concerned about a decreasing basic cultural literacy, the proponents of this philosophy encourage repeated practice of factual information so that the information becomes a part of long term memory.

Another philosophy proposes allowing the natural development of skills to occur in a carefully engineered environment that enhances and facilitates both the cognitive and the affective growth of the child. Drawing from the idealogy and writing of many early educational theorists such Rousseau, Froebel, Pestalozzi, Dewey, Piaget, Vygotsky, and Montessori, the second philosophy focuses on the belief that young children are not well served by being directly taught only skill specific, factual

information. The proponents of this philosophy believe that children's higher order thinking skills are developed by an adult facilitator employing sophisticated questioning techniques. Direct, didactic instruction is less evident with this second philosophy that supports children's ability and need to construct in an active way their own knowledge from their daily environment and social experiences in their lives.

Developmentally appropriate practice is a concept that emerges from the second philosophy. The National Association for the Education of Young Children (NAEYC) promotes developmentally appropriate practice and adheres to the philosophy that children learn and grow through play. One form of play is the use of rhyme, rhythm, and repetition. Children use those elements naturally in play as evidenced by their attraction for nursery rhymes, jump-rope chants, and classic children's songs. The information and concepts contained within the nursery rhymes and songs are retained in memory longer than most information that is presented as unrhymed prose or normal conversational voice tone. When the element of melody is added to rhyme, rhythm, and repetition the two seemingly conflicting philosophies approach compatibility.

The relationship of musical intelligence to logico spatial intelligence is not only suggested by Howard Gardner (1983) but by many other researchers as well. In numerous tests the relationship has been established between the brain's ability to perform well on spatial tasks and musical training (Leng & Shaw, 1991; Rauscher, Hughes, & Miller, 1996; Rauscher, Shaw, Levine, & Wright, 1994). While causation has

not been definitely established in these studies, the research makes a strong case for the inclusion of not only music as a learning strategy in various content areas, but also music education as an enhancer of spatial learning.

The advertising industry has long used jingles and rhymes to capture the attention of the public and channel its buying habits. Stewart and Furse (1986) studied 1,059 advertisements calculating forty two percent contained some form of music. Jingles and slogans increase memorability more than any other element in a commercial (Nobel, 1970). Caleb Gattegno observes, "Young children show great interest in television commercials because they do repeat exactly." (Gattegno, 1969, p.34). Early childhood educators speak of music as a powerful tool to sooth, to ease separation anxiety, to promote learning daily routines, and to stretch a child's ability to memorize (Honig, 1995). The focus of this study was to test the effectiveness of music along with its properties of rhyme, rhythm, and repetition as a playful memory strategy that enables young children to learn highly academic information in a developmentally appropriate way. The two different philosophies surrounding early childhood education approaches, then cease to become mutually exclusive. Young children can use music to learn highly academic information in a developmentally appropriate way.

Statement of the Problem

What is the difference between kindergarten students who hear factual information about the solar system delivered in a teacher's speaking voice, a

teacher's speaking voice with repetition, a teacher's chanting voice, or a teacher's singing voice on the criterion variable of solar system factual knowledge, and is this difference related to the degree of musical aptitude possessed by each student?

Purpose of the Study

The purpose of the study was to test the effectiveness of four different delivery systems for solar system content information to young children. In addition, this study investigated the relationship between solar system knowledge and the variable of musical aptitude. The treatment consisted of providing factual information about the solar system to kindergarten students in four different ways. One group of children was taught this information in the traditional way using a teacher's normal speaking voice. Another group was taught the information in a teacher's normal speaking voice but with the added factor of key phrases being repeated with emphasis and frequency. A third group was given the information in a rhyming, repetition format called a chant, and the last group had the same rhymed, repeated information sung to them. The ultimate goal of the study is to provide educators and curriculum planners with information regarding the effectiveness of the four different vocal delivery techniques so that they can help students learn and retain important factual information more effectively and more efficiently.

Hypotheses

H1 There will be a significant difference between treatment groups on posttest achievement scores on solar system knowledge such that the singing group will score

higher than all other groups; the chanting group will score higher than the speaking with repetition group and the speaking alone group; the speaking with repetition group will score higher than the speaking alone group.

H_2 Controlling for pretest, there will be a statistically significant relationship between the criterion variable of solar system factual knowldge and the predictor variable of musical aptitude.

This study was conducted in sixteen kindergarten classrooms in the southeastern and western United States. Eight classrooms were in public schools in outlying communities of a large metropolitan area consisting of a population in the greater area of approximately one million. Two classrooms were in a large public school of a small suburban area of approximately 5,000 people. The remaining six classrooms were in public schools in smaller southern communities ranging from a population of 3,000 to 4,000. Both control and treatment teachers were experienced teachers. The least experienced teacher had been teaching for five years, and the most experienced teacher had been teaching for thirty years. All teachers were enthusiastic participants in the study. Half the control and treatment classrooms were involved in the study in the spring semester of the 97-98 school year. Another half of the control and treatment classrooms participated during the first semester of the 98-99 school year. This allowed the researcher to examine performance both at the beginning of a kindergarten year and also at the end of a kindergarten year.

Subjects

A total of 460 students formed the original pool from which the sample was drawn. Attrition reduced this pool to 427. A total of 360 kindergarten students between the ages of four and six were then randomly selected for the study. Two classrooms from each of the four groups participated in April and May of 1998. In like matter, two additional classrooms from each of the four groups participated in August and September of 1998. The subjects were enrolled in intact self-contained kindergarten classrooms with one certified teacher per classroom.

Treatment Protocol

The study began with both experimental and control classroom teachers examining The Solar System Factual Knowledge Achievement Test. Supporting factual material was provided in printed form and also verbally explained and clarified for each teacher. This material contains suggestions for how the facts about the solar system can be related to everyday experiences for the kindergarten age child so that the facts were more meaningful and relevant for the children of this age. For example, in explaining the sulfur cloud that hovers over Venus, the children were asked to recall smelling an Easter egg discovered in late summer that was lost in an Easter egg hunt several months before. Their teachers were also instructed to allow the children to smell a vial of sulfur. Enrichment materials for all teachers such as bulletin board displays, big books, and classroom library books were reviewed and presented to the classroom teachers. The number of days of treatment and the number of

minutes of exposure were defined for each teacher and a record keeping sheet was distributed to teachers to chart minutes of daily exposure and also to record the number of student requests to repeat the material. Delivery of content information to the students began when pretesting was completed for each class. The delivery continued for twenty days.

Three treatments were conducted. One treatment group consisted of four intact classrooms, where the teachers used a normal speaking voice with conversational or presentational tone, but the teacher often repeated a key phrase about each solar system element. The phrase was not rhymed. It was a basic parenthetical phrase. i.e, "The sun, the star that's ninety three million miles away."

Another treatment group also consisting of four classrooms chanted a set of lyrics about each element of the solar system as the basic form of presentation. The teacher used clarifying explanations of the lyrics, but the basic information for the children to learn was conveyed through the students and teacher participating together in the rhymed chants. An audio tape was supplied to the teacher by the researcher and rehearsed to ensure his or her understanding of the rhythmic nature of the rhymed lyrics. For example: "The sun is a great big star. A giant ball of fire in the sky. It's ninety-three million miles away. It turns the night time into day. The sun is a great big star." The audio tape, however, was for training purposes only. The teachers administered the treatment without the tape accompaniment as the children chanted the lyrics.

The last treatment group, also four kindergarten classrooms, was essentially the same as the previously described chanting group except that the element of melody was added to the lyrics by singing them rather than chanting them. The melody is simple containing the five notes of a pentatonic scale. An audio tape was supplied to the teacher by the researcher and rehearsed to ensure his or her understanding of the rhythm and melody.

The control group consisted of four different intact classrooms where teachers were free to deliver the content information using a normal speaking voice with conversational or presentational tone and using the supplied enrichment material as he or she saw fit.

Instrumentation

The study used Primary Measures of Music Audiation by Edwin F. Gordon(composite reliability for the kindergarten group was .90) The test was administered by trained personnel assisted by each classroom teacher. Each student's response sheet was scored by the researcher following scoring guidelines.

The Solar System Factual Knowledge Test is a researcher designed instrument. It was piloted in a suburban school district during the 1996-97 school year. Content validity consisted of reviews of Form A and Form B by three different experts in both early childhood and science education. In this study the Solar System Factual Knowledge Test Form A was administered verbally to each subject individually. A trained tester familiar to each subject read each of the eleven questions and recorded

each subject's response verbatim. The researcher evaluated the student's responses to determine accuracy. A total score was recorded for the student on the pre-test. At the completion of treatment the trained testers individually administered the Solar System Factual Knowledge Test Form B. The tester, a person familiar to the student, read the question to each student and again wrote the verbal response verbatim. The researcher assessed each student's answers and assigned a posttest score. The mean gain of the groups was compared using a one way ANOVA. A correlation between the composite score on the Gordon's Primary Measure of Music Audiation and the gain from pretest to posttest on the Solar System Factual Knowledge was computed using a Pearson r.

Analysis of the Data

Three analyses of scores on the Solar System Factual Knowledge Test were completed in determining acceptance or non-acceptance of hypothesis 1. First, pretest scores of the May groups were compared to those of the September groups on the Solar System Factual Knowledge Test. Next, pretest scores of the speaking alone, speaking with repetition, chanting, and singing groups were compared. Finally, gain scores of the four groups were compared. No difference was evidenced between the subjects in the total sample who received treatment late in the kindergarten year and those who received treatment early in the kindergarten year in an independent t comparison of the two groups ($t = -.16$, $df = 425$, $p = .29$). Based on these results, May and September groups were pooled for the next two analyses.

An analysis of variance (ANOVA) indicated that the mean pretest score of the speaking with repetition group was significantly higher than the other group ($F = 240$; $df = 356$; $p = 0.00$). Results from the Scheffe test for multiple comparisons showed the speaking with repetition group ($M = 2.39$, $SD = 1.50$) scored significantly higher than all of the other groups. The scores of the remaining three groups are not significantly different from each other.

In the final analysis relating to Hypothesis 1, a one way analysis of variance (ANOVA) was performed on the gain scores on the Solar System Factual Knowledge Test results of the four groups. The results of the ANOVA showed that the speaking alone group scored significantly lower than any of the other three groups. Speaking with repetition scored significantly lower than either chanting or singing, but significantly higher than speaking alone. Although the gain scores of the singing groups and the chanting groups were significantly higher than either of the other two groups, they were not significantly different from each other ($F = 42.6$; $df = 356$; $p = .000$).

In summary, the ranking of the gain scores on the Solar System Factual Knowledge Tests for the groups was in the order predicted with singing scoring highest, next chanting, then speaking with repetition and finally speaking alone scoring lowest. Speaking alone had not only the lowest numerical gain, but it was also significantly lower than each of the other three groups. Gain scores for speaking with repetition was significantly higher than speaking alone and significantly lower than

chanting or singing. Gain scores on singing and chanting were not significantly different from each other. Hypothesis 1 is only partially accepted as a result of no significant difference existing between the chanting group and the singing group.

Hypothesis 2 stated that a correlation exists between students' musical aptitude and their gain between pretest and posttest on the Solar System Factual Knowledge Test. The results of the Pearson correlation coefficient statistical procedure shows no correlation (correlation = 0.0547, p = 0.301). Hypothesis 2 is rejected.

Summary

The test for research hypothesis 1 used a one way analysis of variance (ANOVA) to test the gain between pretest and posttest on the Solar System Factual Knowledge Test between all the groups. This analysis revealed a significant difference among three of the four groups ($F = 42.6$; $df = 356$; $p<.05$). The speaking alone (the control group) had a mean gain score of 2.49; the speaking with repetition group had a mean gain score of 4.23; the chanting group had a mean gain score of 5.58; and the singing group had a mean gain score of 6.53. The comparison of the gain among groups indicates that repetition alone is not the determining factor in facilitating student's memory. The memory is enhanced by the addition of rhyme and rhythm used in singing and chanting. The addition of melody in the singing and chanting (.95) is not significant. This research suggests that teachers who feel uncomfortable with carrying a tune and singing on pitch could be as effective using

chanting as those teachers who sing the information . Both methods yield much higher student retention than the traditional method of delivering factual information in a normal speaking voice or in a normal speaking voice with repetition.

The comparison between the musical aptitude composite score and the gain between pretest and posttest on solar system factual knowledge showed no significant correlation ($r = .054$; $p = .301$). This indicates that children who scored high on Gordon's Primary Measure of Music Audiation showing a high degree of musical aptitude have no higher pretest-posttest gain scores than those who scored low on the test. Based on the data obtained from this study, it seems that children's knowledge of factual content is not affected by their possession of musical aptitude or their lack of it.

Discussion of Results

An independent t-test performed on the pretest scores of the children in the early kindergarten group in the West and the late kindergarten group in the Southeast showed no difference in either the pretest mean ($t = .94$; $df = 425$; $p = .639$), the pretest-posttest gain ($t = .16$; $df = 42$; $p = .293$), or the composite score on Gordon's Primary Measure of Music Audiation ($t = .71$; $df = 425$; $p = .606$). These analyses indicate a school year's maturation has no effect on the results of the study with this subject sample.

There was a significant difference between the speaking with repetition group and all other groups on the one way analysis of variance (ANOVA) on the pretest of

solar system factual knowledge. The total possible score was eleven. The speaking alone group mean was 1.28, the speaking with repetition group mean was 2.39, the chanting group mean was 1.1 and the singing group mean was 1.23. The speaking with repetition group contained a subject with an unusually high score of seven out of a possible eleven on The Solar System Factual Knowledge Test. This unusually high score probably accounts for the speaking with repetition group's significantly higher mean on the pretest when compared with the other three groups.

The test for research hypothesis 1 used a one way analysis of variance (ANOVA) to test the gain between pretest and posttest on the Solar System Factual Knowledge Test between all the groups. This analysis revealed a significant difference among three of the four groups ($F = 42.6$; $df = 356$; $p < ,05$). The speaking alone (the control group) had a mean gain score of 2.49; the speaking with repetition group had a mean gain score of 4.23; the chanting group had a mean gain score of 5.58; and the singing group had a mean gain score of 6.53. The comparison of the gain among groups indicates that repetition alone is not the determining factor in facilitating a student's memory. The memory is enhanced by the addition of rhyme and rhythm used in singing and chanting. The addition of melody in the singing group raises the mean score to some degree, but the difference between singing and chanting (.95) is not significant. This research suggests that teachers who feel uncomfortable with carrying a tune and singing on pitch could be as effective using chanting as those teachers who sing the information. Both methods yield much higher

student retention of information than the traditional method of delivering factual information in a normal speaking voice or in a normal speaking voice with repetition.

The comparison between the musical aptitude composite score and the gain between pretest and posttest on solar system factual knowledge showed no significant correlation ($r = .054$: $p = .301$). This indicates that children who scored high on the Primary Measures of Music Audiation showing a high degree of musical aptitude have no higher pretest-posttest gain scores than those who scored low on the test. Based on the data obtained from this study, it seems that children's knowledge of factual content is not affected by their possession of musical aptitude of their lack of it. Although the reliability of Gordon's Primary Measures of Music Audiation is listed as .90 on the kindergarten level, its validity is a concern. Gordon is an expert in music education. The researcher, an early childhood educator, approaches the study with a different frame of reference. She noted extreme fatigue among subjects toward the middle of each subtest. Additionally, many subjects were unable to track a row of possible response blocks across the page effectively. Finally, many subjects in each group had great difficulty with fine motor control and could not successfully circle each answer choice in a way that indicated a definite subject response as same or different. It is the opinion of the researcher that Primary Measures of Music Audiation was not the most effective instrument for assessing the accuracy of subjects to perceive differences in rhythm and tonal patterns if the testing procedures specified in the manual were strictly observed. A more reliable

measure of students' ability to perceive differences might have been achieved if the test were administered individually using headphones for the subject and the tester, administered in several sittings, and the answer sheet marked by the tester based on the verbal responses of the children.

Conclusions

The previous discussion of the results of the data analysis supports the conclusion that there is merit in singing and chanting any factual information that students need to learn. While the retention of this information is solely on the rote memory or knowledge level and devoid of the skill of evaluation, analysis, or systhesis, it is still important in may subect areas to store a data bank of factual information so that the complex thinking skills can be employed more efficiently. The subject area of the solar system was chosen as a study topic because most kindergarten students begin their school year knowing little, if any, information about the topic. This provided an appropriate assessment of the vocal delivery strategies tested in this study as opposed to literacy or numeracy knowledge base. Literacy and numeracy acquisition comes from many sources in a young child's world. Students begin their kindergarten year with such diverse degrees of knowledge in those areas that this particular research study would have difficulty revealing whether the strategy itself increased pupil knowledge or the knowledge came from other sources during the treatment period. For most kindergarten students, the solar system is not a topic likely to be discussed in the home unless parents are particularly interested in the topic and

choose to share the information with their children. Analysis of the data on pretest information showed that with the exception of one child in the speaking with repetition group who scored seven out of a possible eleven correct answers, the students in this sample knew little about the topic before the unit began. The implications of these conclusions, then, can be focused toward three audiences: teacher inservice coordinator, university staff members who design teacher preparation programs, and curriculum planners in charge of implementing programs in public schools.

In the area of inservice training for employed teachers, the results of this study indicate that a teacher's vocal delivery makes a significant difference in student retention of information. Inservice training is needed to alert teachers to the power of the singing/chanting style of delivery. While some teachers might feel comfortable singing and/or chanting information provided to them to share with students, not all may feel capable of creating the song or chant themselves. Inservice sessions in which teachers work together to compose such jingles could be effective in creating clever material to sing or chant.

In the area of teacher preparation, coursework in which preservice teachers are informed about the power of rhyme, rhythm, repetition, and melody might also include developing an inventory of singable or chantable rhymes in various curricular areas. In much the same way preservice teachers now gather information about children's literature in trade book form that enhance and supplement their teaching, specific training might be provided in how to create their own jingles to facilitate

learning. Additionally, preservice teachers should be exposed to some level of music instruction during their course work. This focus should be geared toward the preservice teacher's level of previous experience with music, and requirements should be realistic. Preservice teachers with absolutely no prior knowledge of the language of music, for example, should not be required to conduct bands or choirs competently by the end of their course work requirements, but they should be capable of teaching songs and leading group singing even if their ear training does not allow them to match pitch. Audio tapes can assist teachers in accomplishing this latter task.

In the area of curriculum planning in today's public schools, while knowledge of the solar system is interesting to children and teachers, the curricular areas receiving the most concern in schools today are language arts and mathematics. State and national standards for those areas often require knowledge that may not be developmentally appropriate for young children. In the state of California new language arts standards require kindergarten children to understand a consonant-vowel-consonant spelling pattern by the end of the kindergarten year. Most early childhood educators throughout the state feel that standard is much too rigorous for the developmental level of the child. If the children were exposed to the information through repeated singing or chanting of the concept, however, the requirement could possibly be met with less stress for the child, teacher, and parent than currently exists. The area of mathematics already has audio tapes available for purchase dealing with math facts. Currently, those tapes are not a standard part of public

school classrooms in many areas. Often these kinds of tapes are purchased by interested parents to supplement their child's learning at home. Conceivably, these tapes might be included as a normal classroom activity to reinforce the memorization of those facts. Publishers generally respond to market demands because they are profit oriented. If the educational market voices their desire for factual information addressed through chant or song, the available inventory of sung or chanted factual information might increase.

Also in the area of curriculum planning, music must be a strong part of a back-to-basics movement and be included in state and national curriculum standards. Today's students will be tomorrow's parents. As future parents, they should have a level of musical skill that allows them to provide their own children with strategies for remembering important information. That skill can also support what their own children learn in school by helping them make up singable or chantable jingles for school work that is challenging. This can only happen if today's students who will be tomorrow's parents are provided with adequate musical training during their school years.

Recommendations

The analysis of the data generated from this study illustrates the need for further research on the topic of rhyme, rhythm, repetition, and melody and its effectiveness in students' retention of important factual information. Additional research might convince curriculum planners at universities and public schools that the

strategy is a powerful learning aid and should be included in a collection of teaching strategies for preservice and inservice teachers.

If this study were to be replicated, the first recommendation would be to begin the unit of study at the beginning of the academic year and continue the treatment longer than twenty school days. Classroom teachers need more leeway to provide exposure to the information. Condensing the treatment to twenty school days did not allow flexibility in scheduling or the freedom to take advantage of unexpected school assemblies or other opportunities. Providing longer treatment periods allows the information to be delivered during transition times of the day rather than scheduling a specific block of time during the instructional day in order to provide a uniform number of treatment minutes. Beginning the unit of study early in the academic school year allows the opportunity to perform a delayed posttest to determine if students can still recall the factual information following a period of no exposure, thus offering embedded review in the curriculum.

Treatment in the singing and in the chanting group for this study was delivered *a capella* in order to focus the students' attention on the content of the lyrics. A second recommendation would be to include musical accompaniment for one treatment group. Since even simple musical accompaniment can add the support some classroom teachers need to carry a tune or keep a rhythmic beat, it would be helpful to know if the accompaniment enhances or detracts from student learning and retention.

All subjects in this sample were enrolled in regular public school kindergarten programs that were not ability grouped. Each class contained a wide range of intellectual abilities. Since this treatment might also be effective for students with identified learning challenges, a third recommendation would be to replicate the study using students in a special education program as part of a sample or perhaps the entire sample.

A fourth recommendation would be to test this strategy using other curriculum areas. While children enter school with a wide range of literacy learning, it would be important to note differences between the minimum competency literacy and/or numeracy scores of students who were a part of classrooms where teachers used singing or chanting as one of their teaching strategies and those whose teachers did not employ the strategy.

A fifth recommendation would be to replicate this study on higher grade levels. While Baechtold and Algier got positive results on vocabulary building from their 1986 study using college freshmen, there is little data available on upper elementary students, middle school students, or high school students.

As the researcher collected data, singing and chanting treatment teachers of late kindergarten children noted their surprise at some of the high posttest scores obtained by students believed to be low achievers. In some instances, this solar system unit was the only aspect of these low achieving students' kindergarten year in which they had experienced academic success. Teachers noted a positive parental

validation of these students for the first time all year. A sixth recommendation would be to replicate the study including the variable of academic performance and to supplement the quantitative data with a qualitative section which could record the comments of the teachers and parents who perform well.

A final recommendation is to expand the scope of the study to include the element of physical movement. Studies by Ayers (1972), Hannaford (1995), and Houston (1982) support sensory motor integration as fundamental to school readiness. Researchers could explore whether students could not only sing and chant their way to more efficient learning, but also dance their way as well.

Selected References

Ayers.J. (1991). Sensory integration and learning disorders. Los Angeles: Western Psychological Services.

Baechtold, S. & Algier, A. (1986). Teaching college students with rhyme, rhythm, and ritzy characters. Journal of Reading, 30 (3), 248-253.

Gardner, H. (1983). Frames of mind: The theory of multiple intelligences. New York: Basic Books.

Hannaford, C. (1995). Smart moves. Arlington, Va.: Great Ocean Publishing Co.

Honig, A. S. (1995). Singing with infants and toddlers. Young Children, 50 (5), 72-78.

Houston, J. (1982). The possible human: A course in enhancing your physical, mental, and creative abilities. Los Angeles: Jeremy Tarcher Press.

Leng, X. & Shaw, G.L. (1991). Toward a neural theory of higher brain function using music as a window. Concepts in Neuroscience, 2, 229-258.

Nobel, V. (1970). The effective echo: A dictionary of advertising slogans. New York: Special Libraries Association.

Rauscher, R.H., Hughes, J.L. & Miller, R.J. (1966). Music induced mood affects spatial task performance. Paper presented at the meeting of the American Psychological Society, San Francisco, CA.

Rauscher, F. H., Shaw, G. L., Levine, L. J. & Wright, E. L. (1994). Music and

spatial task performance: A causal relationship. Paper presented at the meeting of the American Psychological Society, San Francisco, CA.

Stewart, D. & Furse, D. (1986). Effective television advertising. Lexington, MA: Heath.